

What is claimed is:

1. A voltage controlled variable capacitance device comprising:

a substrate; and

5 one or more first varactor elements and one or more second varactor elements formed on a surface of said substrate and interconnected in parallel, each of said first and second varactor elements including:

a well formed on the surface of said substrate  
10 and connected to a first terminal;

an insulating film formed on said well; and

an electrode formed on said insulating film and  
connected to a second terminal, said insulating film  
being sandwiched between said well and said electrode,  
15 wherein

the thickness of said insulating film of said first  
varactor element is thinner than the thickness of said  
insulating film of said second varactor element, and the  
number of said first and second varactor elements is set in  
20 accordance with a desired correlation between a voltage  
applied between said first terminal and said second terminal  
and a capacitance between said well and said electrode.

2. The voltage controlled variable capacitance device  
according to claim 1, wherein a diffusion region is formed  
25 in the surface of said well, said diffusion region being of  
the same conduction type as that of said well and connected  
to said first terminal.

3. The voltage controlled variable capacitance device

according to claim 2, wherein said diffusion region is formed at two positions so as to sandwich said electrode, when viewed in a direction perpendicular to the surface of said substrate.

5           4. The voltage controlled variable capacitance device according to claim 1, wherein said substrate is a semiconductor substrate having a conduction type different from that of said well.

          5. The voltage controlled variable capacitance device  
10 according to claim 1, including one first varactor element and one second varactor element.

          6. The voltage controlled variable capacitance device according to claim 1, including two first varactor elements or two second varactor elements, with the other being one in  
15 number.

          7. The voltage controlled variable capacitance device according to claim 1, wherein said voltage controlled variable capacitance device is incorporated in a semiconductor integrated circuit which includes a core  
20 portion for performing calculations and storing data, and an I/O portion for receiving and transmitting signals to and from an external circuit, and said insulating film of said first varactor element is formed at the same time as a gate electrode of a MOS transistor is provided in said core  
25 portion, and said insulating film of said second varactor element is formed at the same time as a gate electrode of a MOS transistor is provided in said I/O portion.

          8. A voltage controlled variable capacitance device

comprising:

a substrate; and

one or more first varactor elements and one or more second varactor elements formed on a surface of said

5 substrate and interconnected in parallel, each of said first and second varactor elements including:

a well formed on the surface of said substrate and connected to a first terminal,

an insulating film formed on said well, and

10 an electrode formed on said insulating film and connected to a second terminal, said insulating film being sandwiched between said well and said electrode, wherein

the dielectric constant of a material forming said  
15 insulating film of said first varactor element is higher than the dielectric constant of a material forming said insulating film of said second varactor element, and the number of said first and second varactor elements is set in accordance with a desired correlation between a voltage  
20 applied between said first terminal and said second terminal and a capacitance between said well and said electrode.

9. The voltage controlled variable capacitance device according to claim 1, wherein a diffusion region is formed in the surface of said well, said diffusion region being of  
25 the same conduction type as that of said well and connected to said first terminal.

10. The voltage controlled variable capacitance device according to claim 9, wherein said diffusion region is

formed at two positions so as to sandwich said electrode, when viewed in a direction perpendicular to the surface of said substrate.

11. The voltage controlled variable capacitance device  
5 according to claim 8, wherein said substrate is a semiconductor substrate having a conduction type different from that of said well.

12. The voltage controlled variable capacitance device  
according to claim 8, including one first varactor element  
10 and one second varactor element.

13. The voltage controlled variable capacitance device according to claim 8, including two first varactor elements or two second varactor elements, with the other being one in number.

14. The voltage controlled variable capacitance device  
15 according to claim 8, wherein said voltage controlled variable capacitance device is incorporated in a semiconductor integrated circuit which includes a core portion for performing calculations and storing data, and an  
20 I/O portion for receiving and transmitting signals to and from an external circuit, and

said insulating film of said first varactor element is formed at the same time as a gate electrode of a MOS transistor is provided in said core portion, and said  
25 insulating film of said second varactor element is formed at the same time as a gate electrode of a MOS transistor is provided in said I/O portion.